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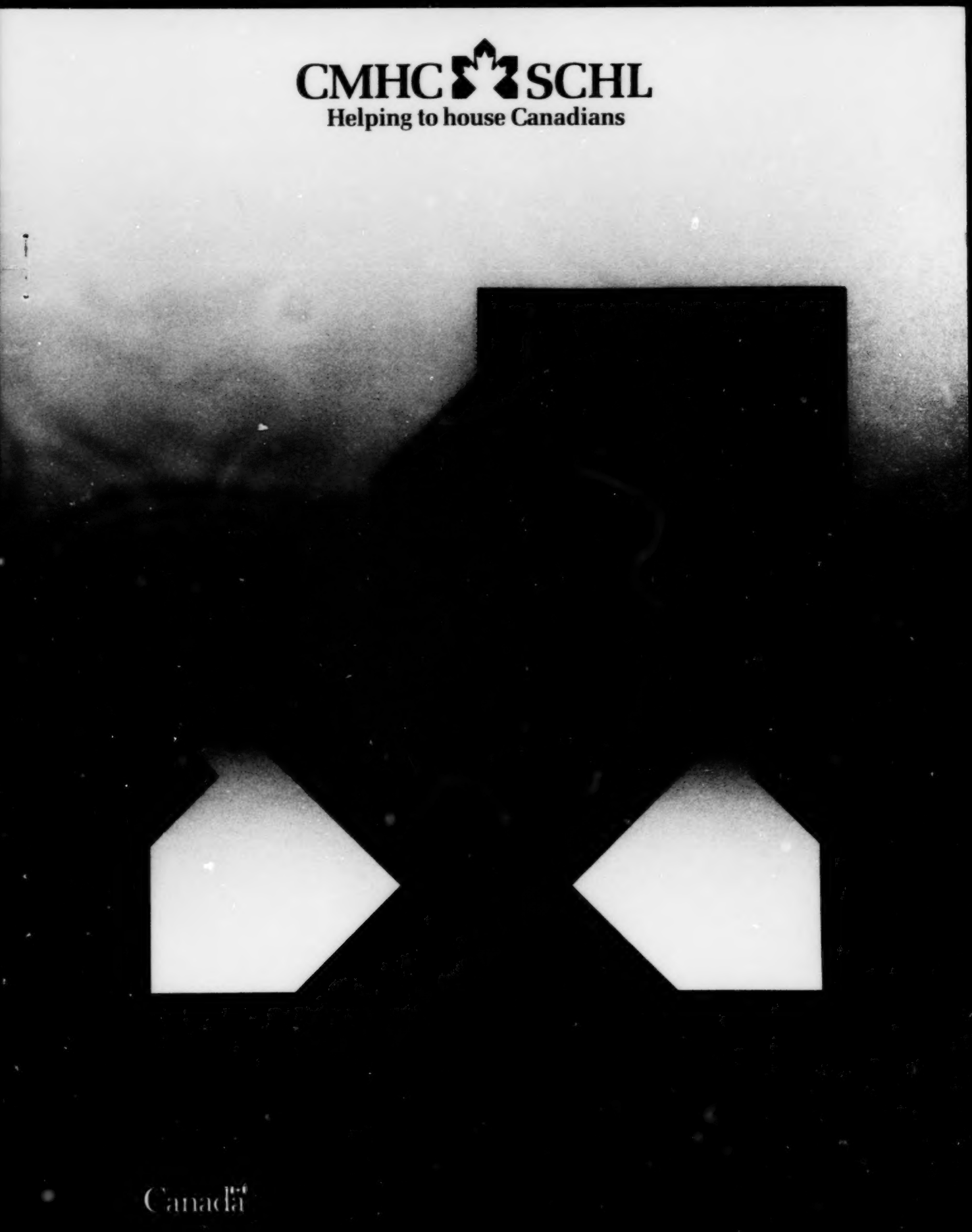

Canada

UPLIFT OF WOOD TRUSSES

IN ATLANTIC CANADA

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Uplift of Wood Trusses in Atlantic Canada

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ABSTRACT

The uplift of wood roof trusses in single and duplex homes continue to be a problem in Atlantic Canada.

A survey of three single and nine duplex units in the Halifax, Bedford, Lower Sackville area of Nova Scotia constructed during the last five years revealed these units had a separation between walls and ceilings of from one sixteenth to one and one quarter inches (three to thirty-two millimeters) caused by truss uplift.

New home building contractors do not appear to be using the information published by HUDAC and CMHC/FORINTEK in the 1980's which it is said would help to reduce or control the problem.

«Soulèvement des fermes de toit en bois dans les provinces de l'Atlantique»

RÉSUMÉ

Le soulèvement des fermes de toit en bois observé dans des maisons individuelles et des duplex est un problème toujours présent dans les provinces de l'Atlantique.

Trois maisons individuelles et neuf duplex construits au cours des cinq dernières années ont fait l'objet d'une étude dans les régions de Halifax, Bedford et Lower Sackville, en Nouvelle-Écosse. On a découvert que ces maisons présentaient une séparation entre les murs et les plafonds, variant de un seizième de pouce à un quart de pouce (de trois à trente-deux millimètres), occasionnée par le soulèvement des fermes.

Les entrepreneurs en construction de maisons neuves n'ont apparemment pas tenu compte des documents publiés dans les années 1980 par l'ACHDU, la SCHL et Forintek, lesquels offraient des solutions pour contribuer à réduire ou à maîtriser ce problème.

CMHC 1989 EXTERNAL RESEARCH PROGRAM PROJECT

UPLIFT OF WOOD TRUSSES ATLANTIC CANADA

CR FILE: 6585/H9-3

BACKGROUND AND INTRODUCTION

Many of the single and duplex residences constructed in the last ten years in the Halifax, Bedford and Lower Sackville area of Nova Scotia were constructed with wood framed walls, floors and roofs.

In general, the roofs are sloped at the front and the rear with the peak in the middle. These sloped asphalt shingled roofs are supported by triangular shaped wood trusses. The trusses are supported at or near their ends by the wood framed walls and need no vertical support between these two outside wall supports. The ceilings and walls are finished with four foot by eight foot sheets of gyprock.

The gyprock for the ceilings is attached to horizontal one inch by four inch wood boards spaced at sixteen inches and they are known as wood ceiling strips or furring. The furring are attached to the underside of the bottom chord of the wood trusses

usually with steel nails. The gyprock sheets are fixed to the furring with wood screws. The gyprock walls are attached to vertical two inch by four inch wood studs spaced at sixteen inches. At the junction of a wall and ceiling a wide standard paper tape is used to make the joint.

In 1980 the Housing and Urban Development Association of Canada (HUDAC), published a Special Bulletin named " Report on Roof Truss Uplift ". It was stated that " the best available evidence indicates that roof truss uplift is caused by lengthening or expansion of the truss top chord as its moisture content increases in the winter. Cold winter air, inside or outside an attic, can hold very little moisture, so it is almost always close to saturation: that is, it has a high relative humidity. This causes the moisture content of the top chord, which is surrounded by that air, to increase. This in turn makes it try to get longer. The bottom chord, which is completely covered by insulation, is in a much warmer dryer environment and therefore tends to stay the same length. In order for the top chord to get longer without breaking the connections to the web members the truss as a whole must arch upward ." When the truss arches upward the ceilings of some residences separate from the interior partition walls.

The bulletin included some practical hints to the builders about the use of " floating ceilings " to allow the trusses to move up and down without damaging the interior finish.

Later the Canada Mortgage and Housing Corporation in association with Forintek produced the CMHC/FORINTEK video " Learning to Live with Truss Uplift ". The video outlines the problem and contains construction techniques as to how to combat the problem by the intelligent spacing of fasteners near the ceiling and wall junction. Essentially the screws holding the gyprock sheets to the furring and wood wall studs are to be kept at certain recommended distances so that the sheets could flex or deflect near their ends as the ceiling moves upward.

The object of this study was to conduct a sight survey of single or duplex units which had experienced the truss uplift problem in the Halifax, Bedford, Lower Sackville area of Nova Scotia to find out what was done to correct it and whether the repair was successful.

PROCEDURE

The Halifax Office of the Atlantic New Home Warranty Corporation was the Reseacher's source for finding owners of single or duplex

units who had experienced the problem of truss uplift. The Corporation maintains a five year warranty program to protect new home owners from short and long term housing defects and records are kept of home owners complaints. One set of records contains complaints with gyprock defects. Truss uplift complaints were included with other gyprock defects such as nail popping and were not specifically identified as a truss uplift problem. With the co-operation of the Corporation, the Researcher was able to spend several days searching the files for potential candidates with a truss uplift problem.

The Researcher contacted thirty-six home owners and discussed their gyprock problem I was able to select twelve of these as probable truss uplift candidates and asked their permission to do a site inspection. Most people were interested in the survey and hoped the study might lead to a solution to their problem.

Before making a site visit, the Researcher reviewed the CMHC/ FORINTEK video and prepared a two page site survey record to collect information. The two pages were refined after a trial inspection and the final form of the questions was decided. Appointments were made with the candidates and equipped with a stepladder, dust mask, measuring tape, humidity measuring device and a camera the Researcher inspected the units.

The information collected for each unit was taken back to the Researcher's office and a word processing program set up in the computer was used to formalize the hand written reports. The site photographs were developed and identified with the appropriate inspection sheets.

RESULTS

The general result of the site survey showed that most home owners, who had units which had experienced truss uplift, had the separation gap between the ceiling and the wall repaired by having it filled with a plaster, putty or wood filler which then cracked again the following winter. One unit inspected, had work done which involved the backing off of the screws which held the gyprock to the furring. In May, the time of the Researcher's inspection, this residence which had exhibited a 1 1/4 inch separation (according to the owner), only showed a crack line. An attic inspection showed a 1/2 inch gap between the furring and the gyprock. This repair seemed to be the only serious attempt to do something other than just fill the cracks.

The gyprock ceilings of all units inspected were fastened to the furring. There were no examples of gyprock fastened directly to the bottom chord of the trusses. Screws were used to fasten the gyrrock to the furring. Most units had furring closely

spaced on either side of the top plate of the partition wall and the gyprock screwed to the furring as illustrated by photographs 1,2 and 4. Therefore the ceilings were fastened at less than the recommended 300mm from the wall to allow for flexing as recommended by the CMHC/FORINTEK video and technical bulletin. The site survey sheets for Candidates 3,4,7, and 10 are included in Appendix I and show the schematic relationship between the the bottom chord of the truss, the furring, the top plate of the partition wall and the polyvapor barrier.

The polyvapor barrier was included in all units inspected. It was usually above the gyprock and under the furring but in some cases it was located under the plate of the partition wall. One unit with a large separation gap had the barrier over the plate and two with a large gap had the barrier under the plate (see Appendix I, pages 17 and 19 for schematic sketch). This seemed to indicate that the placing of the polyvapor barrier over or under the wood plate had no effect on the extent of the uplift of the ceiling.

The relative humidity in the living area as compared to the relative humidity in the attic space did not appear to show any relationship with the size of the gap. A winter check of the attic relative humidity was not included in the study.

Except for one candidate unit, it was revealed by the site inspections that all the units with the truss uplift problem had been repaired by the contractors simply filling the gap and retaping the ceiling wall joint. Since this method did not solve the problem, a large number of dry wall contractors, housing contractors and one truss manufacturer were contacted to get their views on the problem of truss uplift. Their remarks are included in Appendix II.

CONCLUSION

It is more than a likely possibility that the units which were included in the survey will continue to have their ceilings separate from their partition walls.

The contractors involved in the original construction of the units inspected in the Researcher's survey did not make a serious attempt to follow the advice given by NUDAC and CMHC concerning the control of truss uplift. It seems very apparent from the remarks of the contractors included in Appendix II, that many of them were not aware that such advice and information was available on how to deal with truss uplift.

Uplift of Wood Trusses in Atlantic Canada

Table A

Record of Truss Uplift and Truss Lengths

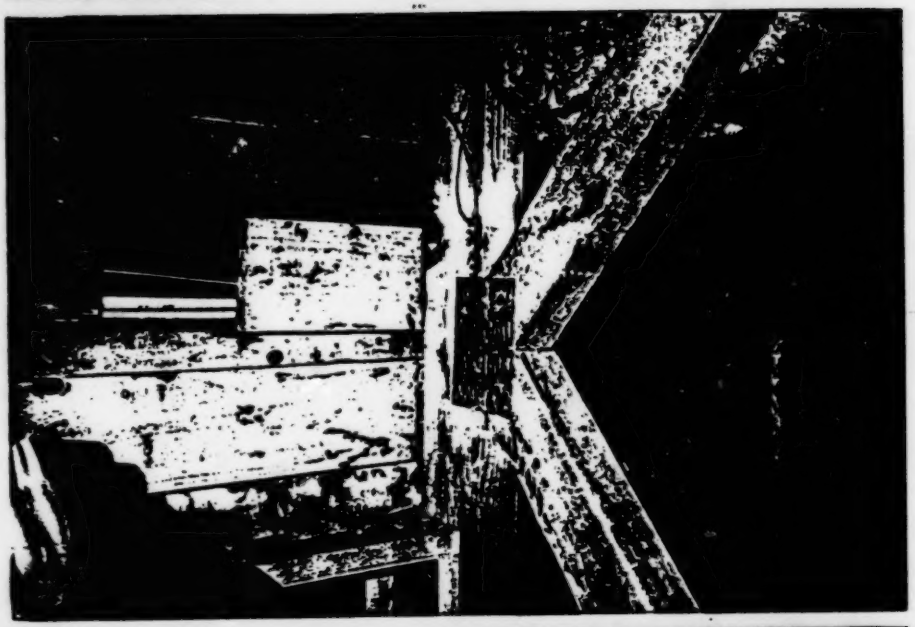
Candidate Number	Maximum Truss Uplift (inches)	Wall to Wall Length of Wood Truss (feet - inches)	
1	1/16	36	0
2	1/8	35	9
3	1 1/4	23	0
4	3/4	27	5
5	1/2	27	5
6	1/16	27	0
7	1 1/4	22	0
8	1/4	27	2
9	1/4	30	10
10	3/4	40	0
11	1/8	28	0
12	1/16	36	0

Table B

Site Survey Photographs

Candidate Number	Photograph Number	Photograph Illustrates
2	1	Furring Arrangement above Uplift Area
3	2	Furring Arrangement above Uplift Area
3	3	Typical End Wall Attic Ventilation Louvre
4	4	Furring Arrangement above Uplift Area
5	5	Tape over Repaired Area
6	6	Spikes Fastening Top Plate of Interior Partition Wall to Underside of Wood Truss Bottom Chord above Truss Uplift Area
7	7	Severe Uplift Separation Gap of Interior Wall and Ceiling
10	8	Repeat Uplift Crack at Ceiling and Wall
10	9	Typical Insulation Cover of Bottom Chord of Wood Trusses

Photograph Number 1

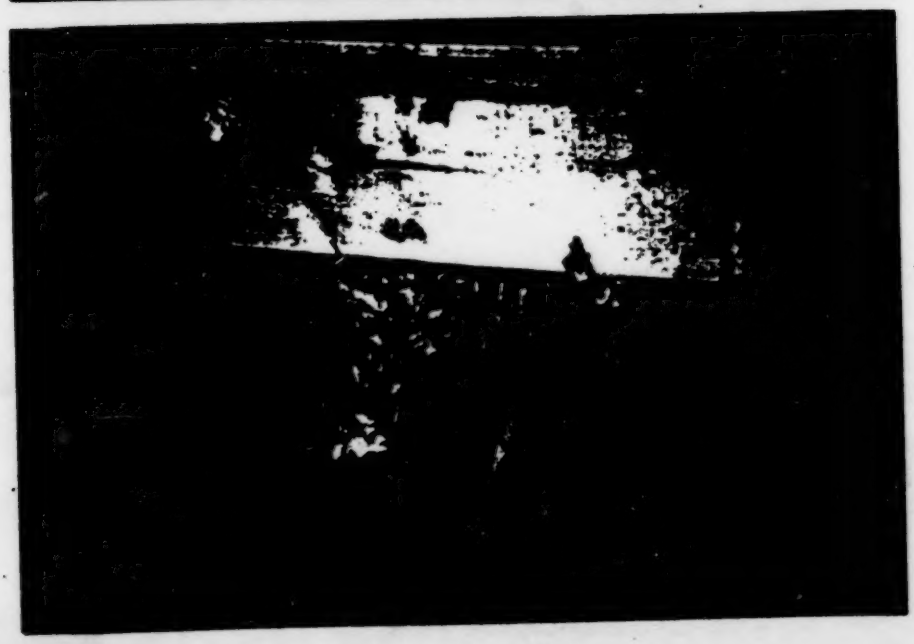


Photograph Number 2

Photograph Number 3

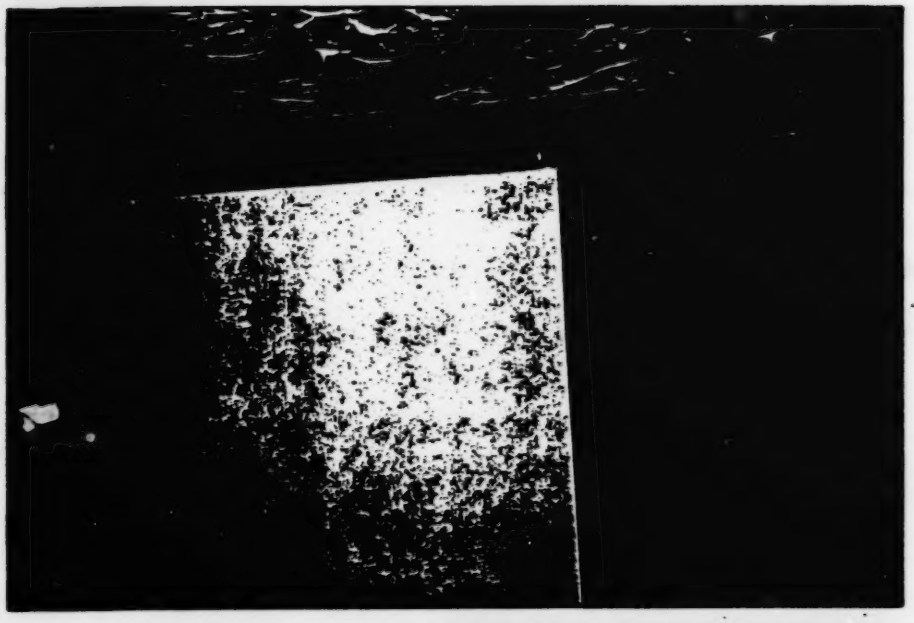
Photograph Number 4

Photograph Number 5



Photograph Number 6

Photograph Number 7



Photograph Number 8

Photograph Number 9

Uplift of Wood Trusses in Atlantic Canada

Appendix I

Site Survey Sheets for Candidates 3,4,7, and 10

UPLIFT OF WOOD TRUSSES IN ATLANTIC CANADA
SITE SURVEY INFORMATION SHEET

CANDIDATE NUMBER: 3 UNIT: SINGLE FAMILY ( ) DUPLEX (X)

DISTANCE INTERIOR PARTITION WALL FROM EXTERIOR WALL LEFT: 13'-8
RIGHT: 9'-4

LENGTH OF INTERIOR PARTITION WALL: 25'-0

MAXIMUM SEPARATION GAP BETWEEN PARTITION WALL AND CEILING AT TIME OF SURVEY: HAIRLINE MAX. ESTIMATED OR MEASURED BY OWNER: 1 1/4"

HAS THE GAP BEEN REPAIRED: YES (X) NO ( ) REOPENED: YES (X)

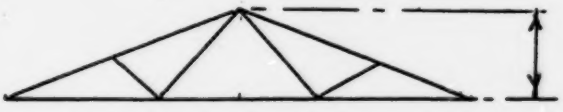
WHAT TYPE OF REPAIR WAS MADE: PUTTY OR WOOD FILLER AND GYPROCK SCREWS BACKED OFF

SEPARATION BETWEEN PARTITION WALL AND FLOOR: YES ( ) NO (X)

TAPE SEPARATED FROM WALL YES: (X) NO ( ) CEILING YES ( ) NO ( )

WOOD ROOF TRUSSES: SPACING: 24" LENGTH WALL TO WALL: 23'-0

SHAPE=



SIZE OF TOP & BOTTOM CHORDS: 3 1/2 X 1 1/2 OTHERS: 2 1/2 X 1 1/2

TOP CHORD WET ( ) DRY (X) BOTTOM CHORD WET ( ) DRY (X)

INSULATION IN ATTIC OVER BOTTOM CHORD OF TRUSSES: 12" FIBRE GLASS

GYPROCK CEILING BOARD FIXED TO WOOD FURRING (3 1/2 X 5/8) WHICH IS FIXED TO BOTTOM CHORD OF TRUSSES: YES (X) NO ( )

AVERAGE SPACING OF CEILING WOOD FURRING: 16"

WOOD PLATE (2 X 4) TOP OF PARTITION WALL NAILED TO BOTTOM CHORD
WOOD TRUSSES: YES ( ) NO (X) GAP BETWEEN PLATE & CHORD: 5/8"+

WOOD FURRING FIXED TO BOTTOM CHORD EITHER SIDE OF WOOD PLATE OF PARTITION WALL: YES (X) NO ( )

METAL CEILING CLIPS VISIBLE: YES ( ) NO (X) SPACING _____

POLYVAPOR RETARDER PRESENT OVER GYPROCK: YES (X) NO (?)

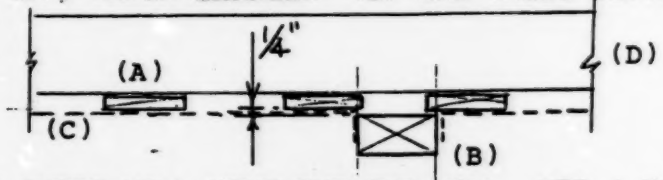
VAPOR RETARDER CARRIED OVER WOOD PLATE: YES ( ) NO (X)

VAPOR RETARDER UNDER WOOD FURRING: YES (X) NO ( )

ARE NAILS VISIBLE WHICH FIX WOOD PLATE TO UNDERSIDE OF THE BOTTOM CHORD OF THE TRUSSES: WOOD PLATE APPEARS TO BE FIXED TO FURRING

ARE ENDS OF ANY GYPROCK CEILING SCREWS VISIBLE THROUGH THE WOOD FURRING: YES (X) NO ( )

SCHEMATIC DETAIL SHOWING RELATIONSHIP BETWEEN WOOD FURRING (A), WOOD PLATE (B), VAPOR BARRIER (C) AND TRUSS BOTTOM CHORD (D):



IN ATTIC IS THERE WALL VENT ONE END WALL: YES (X) NO ( )
BOTH ENDS: YES ( ) NO (X) APPROXIMATE SIZE 8 X 10

ARE THERE ANY OTHER VENTS? ROOF: YES ( ) NO (X)
EAVE TRUVENTS: YES (X) NO ( ) BETWEEN EVERY TRUSS

DAYLIGHT SEEN AT EAVES FROM INSIDE ATTIC SPACE: YES ( ) NO (X)

IF SCREW ENDS OF GYPROCK SCREWS LOCATED WERE THEY LESS THAN 300 MM. FROM WOOD PLATE OF PARTITION: YES (X) NO ( )

TEMPERATURE IN LIVING AREA OF RESIDENCE: 21 HUMIDITY: 53 %

TEMPERATURE IN ATTIC: 26 HUMIDITY: 46 %

CANDIDATE NUMBER: 3 PAGE 2 OF 2

UPLIFT OF WOOD TRUSSES IN ATLANTIC CANADA
SITE SURVEY INFORMATION SHEET

CANDIDATE NUMBER: 4 UNIT: SINGLE FAMILY ( ) DUPLEX (X)

DISTANCE INTERIOR PARTITION WALL FROM EXTERIOR WALL LEFT: 17'-0
RIGHT: 10'-5

LENGTH OF INTERIOR PARTITION WALL: 21'-0

MAXIMUM SEPARATION GAP BETWEEN PARTITION WALL AND CEILING AT TIME OF SURVEY: 1/32" MAXIMUM ESTIMATED OR MEASURED BY OWNER: 3/4"

HAS THE GAP BEEN REPAIRED: YES ( ) NO (X) REOPENED: YES (X)

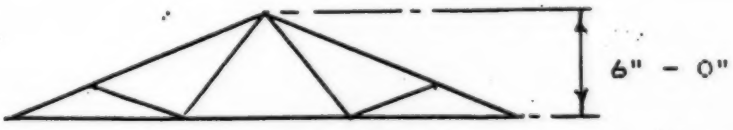
WHAT TYPE OF REPAIR WAS MADE: NONE

SEPARATION BETWEEN PARTITION WALL AND FLOOR: YES ( ) NO (X)

TAPE SEPARATED FROM WALL: YES ( ) NO (X) CEILING YES ( ) NO (X)

WOOD ROOF TRUSSES: SPACING: 24" LENGTH WALL TO WALL: 27'-5

SHAPE=



SIZE OF TOP & BOTTOM CHORDS: 3 1/2 X 1 1/2 OTHERS: 2 1/2 X 1 1/2

TOP CHORD WET ( ) DRY (X) BOTTOM CHORD WET ( ) DRY (X)

INSULATION IN ATTIC OVER BOTTOM CHORD OF TRUSSES: 16" POURING WOOL

GYPROCK CEILING BOARD FIXED TO WOOD FURRING (3 1/2 X 5/8) WHICH IS FIXED TO BOTTOM CHORD OF TRUSSES: YES (X) NO ( )

AVERAGE SPACING OF CEILING WOOD FURRING: 16"

WOOD PLATE (2 X 4) TOP OF PARTITION WALL NAILED TO BOTTOM CHORD WOOD TRUSSES: YES ( ) NO (X) GAP BETWEEN PLATE & CHORD: 5/8"

WOOD FURRING FIXED TO BOTTOM CHORD EITHER SIDE OF WOOD PLATE OF PARTITION WALL: YES (X) NO ( )

METAL CEILING CLIPS VISIBLE: YES ( ) NO (X) SPACING _____

POLYVAPOR RETARDER PRESENT OVER GYPROCK: YES (X) NO ( )

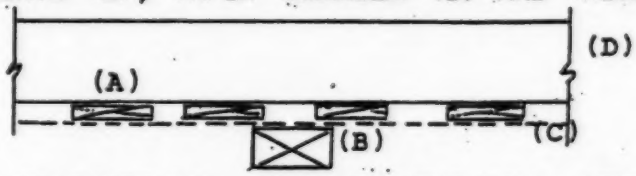
VAPOR RETARDER CARRIED OVER WOOD PLATE: YES (X) NO ( )

VAPOR RETARDER UNDER WOOD FURRING: YES (X) NO ( )

ARE NAILS VISIBLE WHICH FIX WOOD PLATE TO UNDERSIDE OF THE BOTTOM CHORD OF THE TRUSSES: WOOD PLATE APPEARS TO BE FIXED TO FURRING

ARE ENDS OF ANY GYPROCK CEILING SCREWS VISIBLE THROUGH THE WOOD FURRING: YES (X) NO ( )

SCHEMATIC DETAIL SHOWING RELATIONSHIP BETWEEN WOOD FURRING (A), WOOD PLATE (B), VAPOR BARRIER (C) AND TRUSS BOTTOM CHORD (D):



IN ATTIC IS THERE WALL VENT ONE END WALL: YES ( ) NO (X)
BOTH ENDS: YES ( ) NO (X) APPROXIMATE SIZE

ARE THERE ANY OTHER VENTS? ROOF: YES ( ) NO (X)
EAVE TRUVENTS: YES (X) NO ( ) BETWEEN TRUSSES

DAYLIGHT SEEN AT EAVES FROM INSIDE ATTIC SPACE: YES (X) NO ( )

IF SCREW ENDS OF GYPROCK SCREWS LOCATED WERE THEY LESS THAN 300 MM. FROM WOOD PLATE OF PARTITION: YES (X) NO ( )

TEMPERATURE IN LIVING AREA OF RESIDENCE: 20.5 HUMIDITY: 60 %

TEMPERATURE IN ATTIC: 26.5 HUMIDITY: 58 %

CANDIDATE NUMBER: 4 PAGE 2 OF 2

UPLIFT OF WOOD TRUSSES IN ATLANTIC CANADA
SITE SURVEY INFORMATION SHEET

CANDIDATE NUMBER: 7 UNIT: SINGLE FAMILY (X) DUPLEX ( )

DISTANCE INTERIOR PARTITION WALL FROM EXTERIOR WALL LEFT: 12'-0
RIGHT: 10'-0

LENGTH OF INTERIOR PARTITION WALL: 34'- 8 (NON CONTINUOUS)

MAXIMUM SEPARATION GAP BETWEEN PARTITION WALL AND CEILING AT TIME OF SURVEY: 1/4" MAXIMUM ESTIMATED OR MEASURED BY OWNER: 1 1/4"

HAS THE GAP BEEN REPAIRED: YES (X) NO ( ) REOPENED: YES (X)

WHAT TYPE OF REPAIR WAS MADE: PLASTER FILLER

SEPARATION BETWEEN PARTITION WALL AND FLOOR: YES ( ) NO (X)

TAPE SEPARATED FROM WALL:YES (?) NO ( ) CEILING YES (X) NO ( )

WOOD ROOF TRUSSES: SPACING: 24" LENGTH WALL TO WALL: 22'-0

SHAPE=

SIZE OF TOP & BOTTOM CHORDS: 3 1/2 X 1 1/2 OTHERS: 2 1/2 X 1 1/2

TOP CHORD WET ( ) DRY (X) BOTTOM CHORD WET ( ) DRY (X)

INSULATION IN ATTIC OVER BOTTOM CHORD OF TRUSSES:18" POURING WOOL

GYPROCK CEILING BOARD FIXED TO WOOD FURRING (2 1/2 X 3/4) WHICH IS FIXED TO BOTTOM CHORD OF TRUSSES: YES (X) NO ( )

AVERAGE SPACING OF CEILING WOOD FURRING: 12"

WOOD PLATE (2 X 4) TOP OF PARTITION WALL NAILED TO BOTTOM CHORD WOOD TRUSSES: YES (?) NO ( ) GAP BETWEEN PLATE & CHORD: 3/4"

WOOD FURRING FIXED TO BOTTOM CHORD EITHER SIDE OF WOOD PLATE OF PARTITION WALL: YES (X) NO ( )

METAL CEILING CLIPS VISIBLE: YES ( ) NO (X) SPACING _____

POLYVAPOR RETARDER PRESENT OVER GYPROCK: YES (X) NO ( )

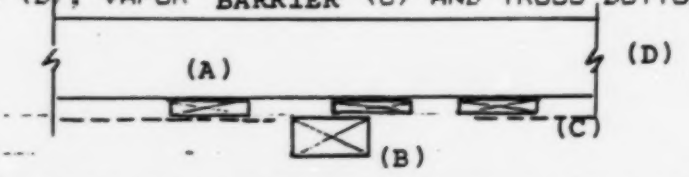
VAPOR RETARDER CARRIED OVER WOOD PLATE: YES ( ) NO (X)

VAPOR RETARDER UNDER WOOD FURRING: YES (X) NO ( )

ARE NAILS VISIBLE WHICH FIX WOOD PLATE TO UNDERSIDE OF THE BOTTOM CHORD OF THE TRUSSES: WOOD PLATE DEFINITELY SPIKED TO FURRING

ARE ENDS OF ANY GYPROCK CEILING SCREWS VISIBLE THROUGH THE WOOD FURRING: YES (?) NO ( )

SCHEMATIC DETAIL SHOWING RELATIONSHIP BETWEEN WOOD FURRING (A), WOOD PLATE (B), VAPOR BARRIER (C) AND TRUSS BOTTOM CHORD (D):



IN ATTIC IS THERE WALL VENT ONE END WALL: YES ( ) NO ( )
BOTH ENDS: YES (X) NO ( ) APPROXIMATE SIZE: 8" X 12"

ARE THERE ANY OTHER VENTS? ROOF: YES ( ) NO (X)
EAVE TRUVENTS: YES (X) NO ( ) BETWEEN EVERY TRUSS

DAYLIGHT SEEN AT EAVES FROM INSIDE ATTIC SPACE: YES ( ) NO (X)

IF SCREW ENDS OF GYPROCK SCREWS LOCATED WERE THEY LESS THAN 300 MM. FROM WOOD PLATE OF PARTITION: YES (?) NO ( )

TEMPERATURE IN LIVING AREA OF RESIDENCE: NR HUMIDITY: %

TEMPERATURE IN ATTIC: NR HUMIDITY: %

NR= NO READING TAKEN

CANDIDATE NUMBER: [illegible] PAGE 2 OF 2

UPLIFT OF WOOD TRUSSES IN ATLANTIC CANADA
SITE SURVEY INFORMATION SHEET

CANDIDATE NUMBER: 10 UNIT: SINGLE FAMILY (X) DUPLEX ( )

DISTANCE INTERIOR PARTITION WALL FROM EXTERIOR WALL LEFT: 18'- 0
RIGHT: 22'- 0

LENGTH OF INTERIOR PARTITION WALL: 8'- 4"

MAXIMUM SEPARATION GAP BETWEEN PARTITION WALL AND CEILING AT TIME OF SURVEY: 1/4" MAXIMUM ESTIMATED OR MEASURED BY OWNER: 3/4"

HAS THE GAP BEEN REPAIRED: YES (X) NO ( ) REOPENED: YES (X)

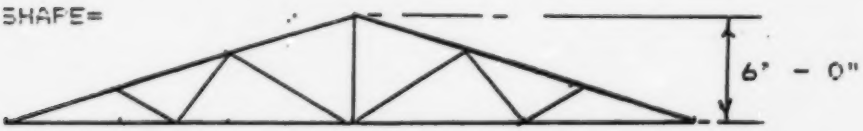
WHAT TYPE OF REPAIR WAS MADE: FILLER TWO OR THREE TIMES

SEPARATION BETWEEN PARTITION WALL AND FLOOR: YES ( ) NO (X)

TAPE SEPARATED FROM WALL: YES (X) NO ( ) CEILING YES (X) NO ( )

WOOD ROOF TRUSSES: SPACING: 24" LENGTH WALL TO WALL: 40'- 0

SHAPE=



SIZE OF TOP & BOT. CH'DS: TC 5 1/2 X 1 1/2 BC: 5 1/2 X 1 1/2
OTHERS 3 1/2 X 1 1/2
TOP CHORD WET ( ) DRY (X) BOTTOM CHORD WET ( ) DRY (X)

INSULATION IN ATTIC OVER BOTTOM CHORD OF TRUSSES: 18" POURING WOOL

GYPROCK CEILING BOARD FIXED TO WOOD FURRING (3 1/2 X 5/8) WHICH IS FIXED TO BOTTOM CHORD OF TRUSSES: YES (X) NO ( )

AVERAGE SPACING OF CEILING WOOD FURRING: 16"

WOOD PLATE (2 X 4) TOP OF PARTITION WALL NAILED TO BOTTOM CHORD WOOD TRUSSES: YES ( ) NO (X) GAP BETWEEN PLATE & CHORD: 5/8"

WOOD FURRING FIXED TO BOTTOM CHORD EITHER SIDE OF WOOD PLATE OF PARTITION WALL: YES ( ) NO (X)

PAGE 1 OF 2

METAL CEILING CLIPS VISIBLE: YES ( ) NO (X) SPACING _____

POLYVAPOR RETARDER PRESENT OVER GYPROCK: YES (X) NO ( )

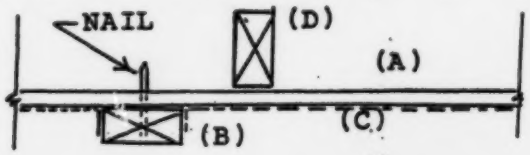
VAPOR RETARDER CARRIED OVER WOOD PLATE: YES ( ) NO (X)

VAPOR RETARDER UNDER WOOD FURRING: YES (X) NO ( )

ARE NAILS VISIBLE WHICH FIX WOOD PLATE TO UNDERSIDE OF THE BOTTOM CHORD OF THE TRUSSES: WOOD PLATE SPIKED TO FURRING

ARE ENDS OF ANY GPYROCK CEILING SCREWS VISIBLE THROUGH THE WOOD FURRING: YES (X) NO ( )

SCHEMATIC DETAIL SHOWING RELATIONSHIP BETWEEN WOOD FURRING (A), WOOD PLATE (B), VAPOR BARRIER (C) AND TRUSS BOTTOM CHORD (D):



IN ATTIC IS THERE WALL VENT ONE END WALL: YES ( ) NO ( )
BOTH ENDS: YES (X) NO ( ) APPROXIMATE SIZE: 10" X 10"

ARE THERE ANY OTHER VENTS? ROOF: YES ( ) NO (X)
EAVE TRUVENTS: YES (X) NO ( ) BETWEEN TRUSSES

DAYLIGHT SEEN AT EAVES FROM INSIDE ATTIC SPACE: YES (X) NO ( )

IF SCREW ENDS OF GYPROCK SCREWS LOCATED WERE THEY LESS THAN 300 MM. FROM WOOD PLATE OF PARTITION: YES (X) NO ( )

TEMPERATURE IN LIVING AREA OF RESIDENCE: 22 HUMIDITY: 49 %

TEMPERATURE IN ATTIC: 25 HUMIDITY: 39 %

Appendix II

SUMMARY OF TELEPHONE SURVEY OF DRY WALL CONTRACTORS, HOUSING CONTRACTORS AND WOOD TRUSS MANUFACTURER CONCERNING THEIR EXPERIENCE WITH TRUSS UPLIFT AND TRUSS UPLIFT REPAIRS

DRY WALL CONTRACTORS:

1. He would fill the gap and retape & had not heard of the term truss uplift. He would put in an allowance in gyprock price to allow his coming back to fix problem if required by contractor.

2. He would repair the problem by using 1/4 wood rounds as a ceiling molding, fastening it to the ceiling but not the wall. He had not heard of the seminar but had heard about truss uplift over the years of working with dry wall. He is into commercial buildings now such as apartments and some architects specify RC-1 channels for fastening of the gyprock. When the uplift was severe he'd consider using RC-1 channels and an extra layer of gyprock over the existing gyprock area to be repaired. This would reduce ceiling height by 1".

3. He suggested use of corner beads and not fastening the screws close to them. He had not heard of video and hadn't attended seminar. He did not believe there was much you could do about uplift after the fact. Piece work costs would go up with use of angle beads.

4. He knew the term truss uplift and thought it was caused by not enough ventilation in the attic. He tries to fasten the walls securely to the trusses and if repair is necessary he described how he repaired the problem with an extra block of wood fixed to the bottom chord of truss and to the top plate of the partition wall to hold the truss more firmly to the partition wall. He would wait until the Spring when the gap was closed and use lag screws to fasten block to the top plate of the wall. He did not have to return to repeat the repair. He had tried two or three times to screw gyprock ceiling sixteen inches away from walls. He remembered general location of houses but not the exact location. He said the problem was more prominent (one out of three) in roof trusses of bungalow type residences. Hip roof units did not have this problem. He also tried white latex caulking at ceiling wall junction because it would stretch.

4. cont'd
He believed part of the problem was because houses were being constructed too quickly with green wood. He has not taken seminar or heard of it.

5. He would use ceiling bead similar to corner bead to repair the problem. He was not familiar with truss uplift problem or seminar program.

6. She hadn't seen one in two to three years. She had filled crack and retaped. She hadn't heard of educational seminar but would be interested in learning more. Before dry wall work she had been involved with truss manufacturer who had tried to modify trusses.

7. He had looked over one repair job and had thought the floor had settled. Another he had taped and filled 5-6 years ago and heard no more. He thought wood molding would conceal.

8. He figured wood was drying out when he saw a repair job. He tried filling (Durobond 90 and 45) and taping. It did not work. He then used 1/4" industrial wall vinyl on walls and thought that strong enough to withstand pressure. Appeared the vinyl was cut to suit the ceiling contour and he was confused about what was taken place when bottom chord of trusses lifted.

9. He would fill cracks and retape. He was not aware of specifics of truss uplift problem.

10. He would use steel plates at peak and ends of wood trusses to reinforce the truss and felt it would eliminate 75% of the problem.

11. He would pull tape back, fill with Durobond 90 after going up into attic and renailing or bracing the bottom chord of the trusses to hold it down. He associated the problem with frost getting into the attic. He felt bungalow residence trust uplift occured along hallway centre partition. He had not been asked to go to seminar or told by general contractor about information available.

12. In 15-20 years of he'd never seen one he thought caused by truss uplift. He assumed as a footing problem. He filled crack and retaped.

13. He repaired one specified as truss uplift by filling crack and retaping. The crack occured again. On another job or two he remembered removing some screws at the corners. Normally he places one screw every 12 inches. Did not take seminar though he had heard something about it. He had gotten copy of a booklet that suggested not fastening at the corners. He would install an angle bead if requested but it was more expensive. He didn't remember replacing 1 1/4 inch screws with longer ones for holding gyprock.

14. He applied principles of video to 16 x 25 ft. two room addition to existing home. The addition also had preserved wood foundation. He has address and unit could be checked in winter to measure success. If he was to do a repair, he'd take screws out near corner, patch holes and retape.

15. He always uses four or five toe nails to fasten top plate of partition wall to bottom chord of truss and same number to fasten bottom plate of partition wall to the floor system every sixteen inches. He uses "rough" thread screws for fastening gyprock, one screw only every 1 x 4 strapping. He fastens close to the corner and has experienced no problem with truss uplift.

16. He uses studs which are precut 1/4 inch different than required to allow for shrinkage of wood and thought this avoided uplift problem.

17. He tried special hardware to hold top plate of partition to truss and only succeeded in pulling partition up from floor. His cousin's place has gap that opens and closes. He can't find remedy. Never came across anyone since 70's who had complete answer. Electric heat systems since then may contribute to problem. He thought the shorter the trusses the less the problem.

HOUSING CONTRACTORS

1. He said he tried to follow the procedure outlined by the CMHC/Forintek video and booklet guide but impossible to get workers not to fasten gyprock near partition-ceiling corners unless he was standing there watching them. He has not had any severe truss uplift problem. He gets workers

1. cont'd
to securely toe nail bottom chord of trusses with four nails every sixteen inches nailed through 2 x 4 wood plate, 1 x 4 strapping and into bottom chord of trusses. He also used only one 3 1/2 inch nail at sixteen inches nailed vertically to hold bottom plate of partition wall to floor system. If uplift occured, it would be minimal, bottom plate would lift no more than 1/4 inch and this would be concealed by thickness of wall to wall carpets. The interior partitions are always made up to allow for the thickness of the ceiling strapping. There was a time when nailing of partitions to bottom chord of trusses was not an acceptable standard.

2. He said he was involved with building the house from start to finish and described framing method before installation of interior partitions and then how gyprock was installed. He made sure there was very positive support and fastening of partitions to truss. He used long galvanized nails. He also used two screws instead of one at twelve inch centres when fastening gyprock. He fastened gyprock near corners into 1 x 4 strapping placed either side of top plate of partition wall. He never had a truss uplift problem and believed his care in making sure every member was put solidly together is what made the difference.

3. He uses corner bead at all times for last 2 to 3 years and hasn't had any problem. He doesn't fasten gyprock at corners. He meets with subtrade before work begins and makes sure the method is followed. He said he was just completing one, therefore I couldn't see what they had done. He said he would call when they reached the point of fastening gyprock so I could have a look at next house.

4. He does homes using convential wood rafter system and has not experienced uplift problem at partition walls.

5. Over the years he has tried several methods of fastening gyprock. Recent innovation is to use raised heel trusses especially for longer spans. The hope is that some of the movement will be taken up in the larger end connection of the truss. One truss manufacturer is confident it works. Older method of using corner beads was successful but took longer. Workmen on piece rate job couldn't do enough square .

5. cont'd
footage of gyprock to make it pay, so extra money required. He has tried metal clips to fasten top plate of partition walls to truss bottom chords. This was also extra expense. He said not putting screws near corners good in theory but difficult to adopt in practice. One example is that you are left with one screw in the middle of a 40 inch corridor gyprock ceiling. Temporary supports until final pieces of wall gyprock in place too slow. A wide corner bead works but difficult to level ceiling. If he was to repair uplift he'd use latex caulking or a wood molding.

TRUSS MANUFACTURER

1. No real solution. Hurricane clips tried, sometimes helped. He understood principle of floating joint. He thought someone had tried something like Flexcell, a compressible expansion joint material, along intersection of corner of gyprock. They are trying high heeled trusses but it increases cost and he doesn't know whether they really work. They may help to make eaves more accessable to air circulation since they create larger opening for Tru Vents. Ventilation may be the problem. Frost in attic, he felt, was part of the problem.